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UNITED STATES DEPARTMENT OF AGRICULTURE • Economic Research Service

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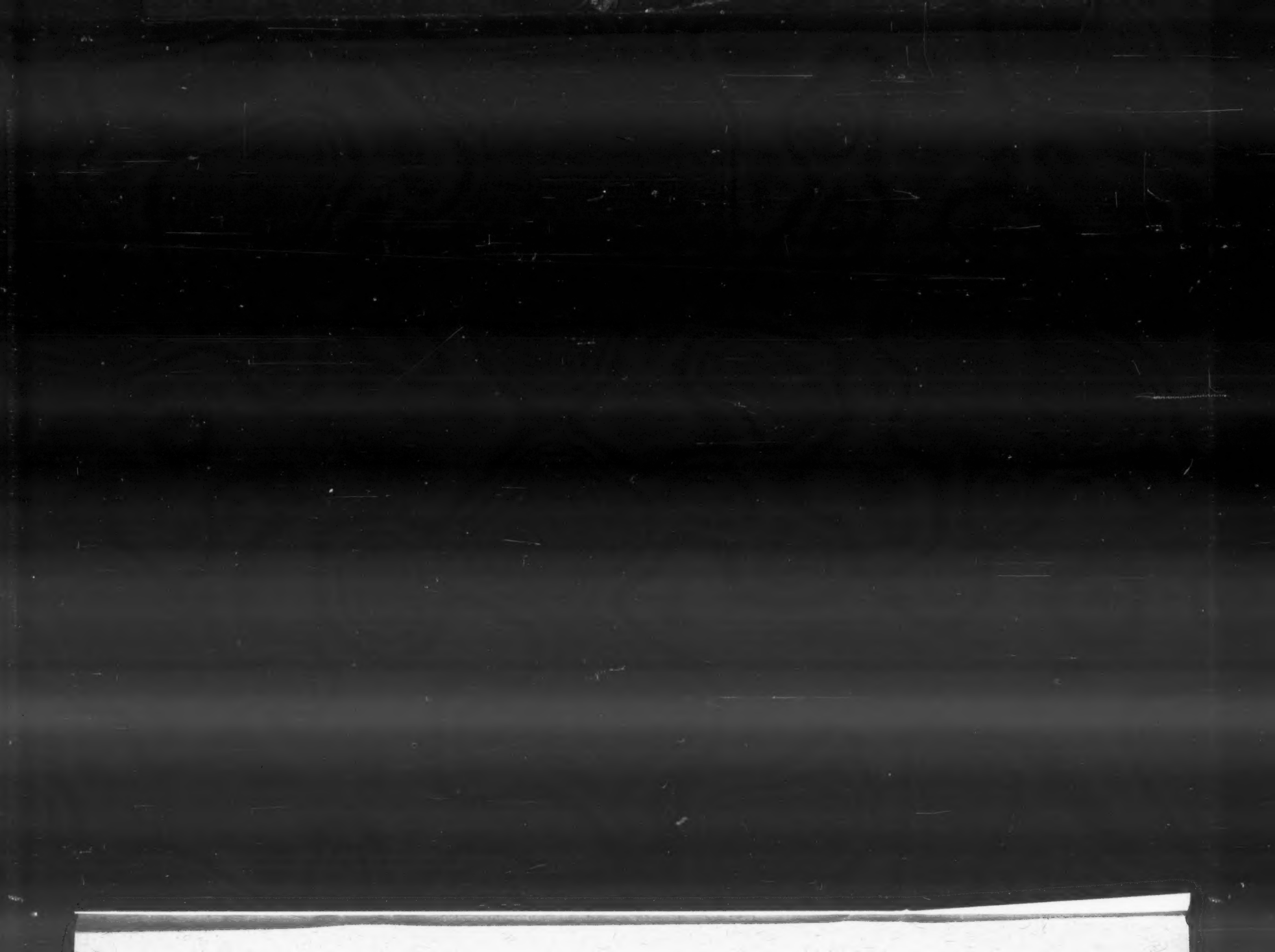

Point Sampling Surveys for Potato Acreage in Colorado's San Luis Valley

By H. F. Huddleston

DURING THE PAST FEW years considerable attention has been given to the collection of agricultural data by probability sampling.

Enumerative surveys employing a large group of trained interviewers often are used to obtain such data. Multiple frame surveys using lists of specialized producers to supplement an area frame may be employed, or several lists may be used to screen the population for the elements with the desired characteristics. In some situations, less sophisticated probability techniques requiring a relatively small group of trained people may offer possibilities of rapid and efficient execution in the field.

If there is a problem of available resources for survey work, the technique of point sampling may provide an alternative which should be considered. Point sampling is a method of observing the use of very small units of areas of equal size whose locations are determined by random points. The sizes of the fields in which the random points fall are immaterial.

This paper gives an example of the application of the technique with the related costs and variances. It presents a brief summary of the survey methodology used during the first 2 years of a project in Colorado. The project was initiated in June 1964 in response to industry desires for an early season forecast of potato acreage for the San Luis Valley in Colorado. The statistician in charge of the Colorado office of the Statistical Reporting Service, R. S. Overton, and his staff directed the survey in the field and assembled source materials for the frame. The county offices of the Agricultural Stabilization and Conservation Service were the source for aerial photographic coverage of the sample units selected for the survey.

The Sampling Frame

There was a need for a sampling procedure which would give an objective and independent estimate of potato acreage in late June. Three sampling frames appeared possible:

1. A list of growers who sold or stored potatoes in the preceding year could be assembled.
2. The materials in the master sample of agriculture could be used.
3. A special area frame could be constructed.

The third frame was considered the most suitable. The list frame in No. 1 was not considered since it might be biased by being out of date, or otherwise incomplete. The frame in No. 2 was not considered efficient because the total land area seemed too large and would result in a large sampling error.

The use of a two-stage point sampling scheme offered the following advantages:

1. A relatively cheap method of direct observation of land use compared with interviewing producers; fastest means of data collection.
2. Objectivity and freedom from certain grower response biases commonly associated with the enumerative or self-enumeration surveys.
3. A ready sample of potato farms and fields for yield estimates and variety classification later in season.
4. Could be executed by a small number of people already trained and employed.

The sampling frame used was an area frame constructed in 1964 to contain the potato acreage in five counties comprising the San Luis Valley. The land area in the frame, totaling 372,800 acres, was subdivided into 563 sampling units (S.U.) of nearly equal land area. The 563 sampling units were grouped into three strata based on contiguous land area and estimated percentage

of total land planted to potatoes. The 1964 frame composition by strata was as follows:

Stratum	Land area (acres)	Number of frame units
1.	191,616	289
2.	132,800	201
3.	48,384	73
Total.	372,800	563

After the 1964 surveys were completed, an analysis and evaluation of the data suggested several modifications in the strata as originally constructed: (1) Several large "islands" of non-cultivated land could be excluded from the frame since potatoes were not produced on this type of land, and (2) isolines based on the percentage of points in potatoes indicated different stratum boundaries would reduce the within-stratum variability. The modified frame composition was made up as follows:

Stratum	Land area (acres)	Number of frame units
1.	69,120	108
2.	121,984	184
3.	90,432	139
4.	32,960	49
Total	314,496	480

Sample Design and Estimates

Two estimators were derived, but the results of the 1964 and 1965 surveys (see tables, p. 3) correspond to the first estimator here:

(1) $(\text{Potato acres})_h = P_h \cdot (\text{Land area})_h$

(2) $(\text{Potato acres})_h = \frac{N_h}{n_h} (53.33) \sum_{i=1}^{n_h} Y_{hi}$

The two estimators gave nearly identical estimates of potato acreage for the total population. This is to be expected if the maps used to determine measured land area in the frame and the overlay grid used to locate points on the aerial photographs all had correct scales and the sampling procedures were properly carried out.

The within-stratum variances for the percentage of points in potatoes were computed using the following formula:

$$S^2_{ph.} = \left(\frac{N_h - n_h}{N_h n_h (n_h - 1) \overline{X}^2_{h.}} \right) x$$

$$\left(\sum_{i=1}^{n_h} Y^2_{hi} + P^2_{h.} \sum_{i=1}^{n_h} X^2_{hi} - 2 P_{h.} \sum_{i=1}^{n_h} X_{hi} Y_{hi} \right)$$

where

$\overline{X}_{h.}$ = average number of points per S.U. in hth stratum
X_{hi} = number of points for ith S.U. in hth stratum
Y_{hi} = number of points found in potatoes for ith S.U. in hth stratum
$P_{h.}$ = percentage of points in potatoes $\overline{Y}_{h.} \div \overline{X}_{h.}$
N_h = number of S.U. in hth stratum
n_h = number of S.U. sampled in hth stratum

The standard error for the acreage estimate is $S_{Ah} = S_{ph} \cdot (\text{Land area})_{h.}$

To insure the completeness of the acreage estimates for the entire valley, growers who had land outside the frame area and who had previously grown potatoes were enumerated each year. The enumeration in 1965 uncovered an additional 400 acres. This acreage was on marginal potato land and was not likely to increase substantially unless new land was brought into cultivation. But to prepare for such increases, provision was made for new land to enter into the frame each year and to be sampled at the same rate as the previous sampling units in the appropriate strata.

The use of a list frame for stratum 4 appeared desirable if estimates were to be published by strata, since relatively few growers were involved and their acreage could be completely enumerated each year. However, this was not expected to reduce the sampling error for the entire valley. The sampling plan adopted was

to use the stratified two-stage point sample scheme for strata 1, 2, and 3, with a list frame for stratum 4.

A stratified sample of 100 first-stage sampling units (area segments) was used in 1964 with points as secondary units located within the segments at a rate of one point per 53 acres.

Results of the 1964 survey are shown here:

Stratum	Number of units sampled	Estimated potato acreage	Standard error of acres
1.	52	22,592	3,301
2.	35	8,433	2,336
3.	13	1,210	531
Total. . . .	100	32,235	4,079 (12.7%)

Results of the 1965 survey using a modified frame, optimum number of points, and an independent selection of first-stage units are shown below:

Stratum	Number of units sampled	Estimated potato acreage	Standard error of acres
1.	27	17,156	1,544
2.	46	9,088	1,181
3.	34	8,573	1,526
4.	13	517	201
Total . . .	120	35,334	2,480 (7.0%)

Two-Stage Point Selection and Cost Per Sampling Unit

A systematic selection of first-stage sampling units was made in each stratum using a random start. The sampling units in the frame were listed in a serpentine fashion from east to west and west to east, starting in the northeastern corner of the stratum. To locate the points within selected segments, a transparent plastic overlay with a systematic pattern of small holes was used. A random starting corner was used for each sampling unit. This consisted of selecting two random coordinates between zero and D where D represents the distance between points on the overlay, and matching this point with the point furthest north and west in the segment on the photograph. A narrow pen with a fine point was inserted in the small holes in the overlay to ink the points permanently on the photographs for field inspection. The points were located at a rate of one point per 53 acres in 1964 with the total number of points being a variable which ranged over rather narrow limits because of the nearly equal segment size. This procedure resulted in an average of 12.6 points per sampling unit in 1964.

An analysis of the 1964 data on variability and costs indicated the optimum number of points per S.U. should be approximately 14 in strata 1, 2, and 3, and 30 or more in stratum 4. These modifications were made for the 1965 survey. The average cost components per sampling unit in 1964 were: (1) Between S.U., $3.11; (2) within S.U., $1.55; and (3) field supervision, $2.19. Costs were based on payment of 9¢ a mile for transportation and salary of $3 an hour. The technique for determining the optimum cluster size can be found in Hendricks (see References) or other available textbooks. The relationship used to determine the optimum number of points was:

$$m_{opt} = \left(\frac{\sigma_w^2}{\sigma_B^2} \cdot \frac{C_B}{C_w / \bar{m}} \right)^{\frac{1}{2}}$$

where

C_B = cost between S.U.
C_w = cost within S.U.
$\bar{m}$ = average number of points per S.U.

and σ_w and σ_B are the variance components found within and between sampling units in the same stratum, using analysis of variance of the variable P_{hi} (i.e., $Y_{hi} \div X_{hi}$). The pooled sample estimates of σ_w^2 and σ_B^2 from the 1964 data were 0.07013 and 0.00922.

A breakdown of the cost per sampling unit follows:

Between sampling units--C_B	
Mileage--19 miles at 9¢	$1.71
Salary--28 minutes at 5¢	1.40
	$3.11
Within sampling units--C_w	
Mileage--5 miles at 9¢	$ .45
Salary--22 minutes at 5¢	1.10
	$1.55
Field supervision	
Mileage--15 miles at 9¢	$1.30
Salary--16 minutes at 5¢	.80
Per diem--0.01 day at $9	.09
	$2.19
Total field costs	$6.85

Field work for the survey required use of three people for three days.

In most cases the points could be inspected by driving a car along the field edge. However, inspection of the land use beneath some of the points required the technician to walk as much as half a mile.

Reinspection of the sample points later in the season for variety and yield work revealed only one point incorrectly classified.

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Land Returns and Farm Real Estate Values[1]

By Albert A. Montgomery and
Joseph R. Tarbet

FARM REAL ESTATE values have risen almost steadily over the past decade despite the apparent lack of a supporting upward trend in commodity prices and farm incomes. To some extent the farmland price rise reflects the spatial encroachment of urban activities upon agriculture and the growing demand for land by higher priority uses than agriculture. But in many areas of the Nation, including the wheat-pea region of the Pacific Northwest,[2] the main market force is the growing demand for land by farmers themselves. Thus the apparent paradox of the divergent trends in farm returns and land values has awakened the interest of economists and others in the significance of this phenomenon for valuation theory and agricultural policy.[3] If current discussions have identified the range of most probable causes for the national paradox, much remains to be explained by microeconomic study of the relationship between the farm real estate market and the farm economy. This paper presents the results of such a study and, subject to the obvious limitations of data from a small sample in a single region, attempts to make general inferences about the causes and social implications of this phenomenon.

Method of Study

The trends of land prices and farm returns in the region are examined and a simplistic explanation for the observable disparity is given in this paper. In the study we adopted, as a working hypothesis, Scofield's speculation that land prices may be high or rising relative to the average of farm returns in a region but this average may understate the prospective returns from land investment by a few large, wealthy, and better than average farmers who comprise the effective demand for land.[4] Cross-sectional data from two samples of wheat-pea farmers were utilized to test this hypothesis and to generate answers to several questions concerning the economic implications of the region's low rate of current land return.

One sample consisted of 47 persons who responded to a survey of the region's 48 public land transactions during an 18-month period from 1963 to 1964.[5] This survey gave interesting insights into the nature of the operations of actual investors but obviously it was not representative of all wheat-pea farmers who were

[1] Credit is due Michael G. Vance, a Master's candidate in Business Administration at Washington State University, for his work as Research Assistant for the project.

[2] The wheat-pea region is located in southeastern Washington and northern Idaho. For a description of the region's agriculture see USDA's annual bulletin, Farm Costs and Returns--Commercial Farms by Type, Size, and Location (Agr. Inf. Bul. 230).

[3] See Walter E. Chryst, "Land Values and Agricultural Income: A Paradox?" Jour. Farm Econ., 47:1265-73, Dec. 1965.

Editor's note: The research reported in this paper was carried on at Washington State University by business economists. The analysis was based on a working hypothesis suggested by William H. Scofield of the Economic Research Service, it was supported in part by funds from the Washington State Agricultural Experiment Station, and it was aided by farm real-estate cost data developed in the Economic Research Service. Although working relationships were largely informal, the circumstances involved a close community of interest in related research in the Economic Research Service.

[4] William H. Scofield, "Land Prices and Farm Earnings," Farm Real Estate Market Developments, U.S. Dept. Agr., Oct. 1964.

[5] An unpublished survey conducted by Jesse Davis, Research Assistant for the Department of Agricultural Economics at Washington State University.

potential land buyers, much less the universe of wheat-pea farmers. Because of this limitation and the fact that the survey did not provide income and wealth data for the investing farmers, our findings were obtained mainly from a second sample of 35 wheat-pea farmers. These farmers volunteered financial and operating data, enabling an accurate calculation of income, wealth, and net rent for 1962-64.

For reasons given below, the study assumes that this small nonrandom sample is representative of the universe of full-time family farms in the region. The sample does not include representatives from the numerous very small part-time farms in the region, nor any of the region's several very large operations. For that matter, reflecting the relative infrequency of land transactions, this second sample does not contain any farmers who purchased land in 1963-64. However, if the sample is representative of the universe of the region's family farms, it will contain a subset of farm operators with operating and financial characteristics similar to those of farmers who were bidding for or actually bought land in this period. Thus a comparison of this subset with the remainder of the sample will constitute a valid test of the hypothesis.

Trends in Land Prices and Farm Returns

Land prices in the wheat-pea region increased from $233 per acre in 1953 to $320 in 1964 (chart 1).[6] Net farm income and net rent per acre evidenced virtually no trend over this period if 1962, a year of particularly good earnings, is ignored.[7] Therefore, as in the Nation, farm income and the return to land itself declined relative to the average market price of farmland.

The decline in the rate of return, from about 5 percent in 1953 and 1954 to about 3-3/4 percent in 1963 and 1964, suggests that land buyers in this region have been willing to capitalize prospective land returns at decreasing rates. However, it is significant that $56 of the $87 per acre increase in land price over the 12-year period occurred after 1960. In this more recent period farmers of the region came to expect a sharp increase in wheat yield because of the development of a new variety.[8] Because 1962 was the first year of this new wheat's general use as well as being an exceptionally good growing year, it is not proper to slight its importance in the visual examination of past trends.

If that year is included in the end-of-period average of net rents, a 3.9 percent return was being earned on the 1964 price of $320. Although smaller than the rate of return being earned at the beginning of the period, it approximates the average rate earned from 1955 through 1959 on a stable price of about $255. In other words, if the 1962-64 average net rent of $12.35 per acre more closely approximates the post-1960 expectation of future land returns than the average for the 12-year period, much of the land price rise in the past decade could be explained simply by the fact that farmers expected rising land returns in the long run.

In support of this classical explanation, wheat-pea farmers were aware of the possibility in the more recent years that wheat production controls would be lessened in the not too distant future. And it was apparent to all regional farmers--given the existing price structure and the choice of feasible crops to substitute for the high-yielding new wheat--that the return to land and its value would be markedly increased in this event. From the study's sample of farm operators it was determined that if a farm wheat price of $1.80 could have been sustained without acreage control in 1962-64, existing farm practices in the region would have

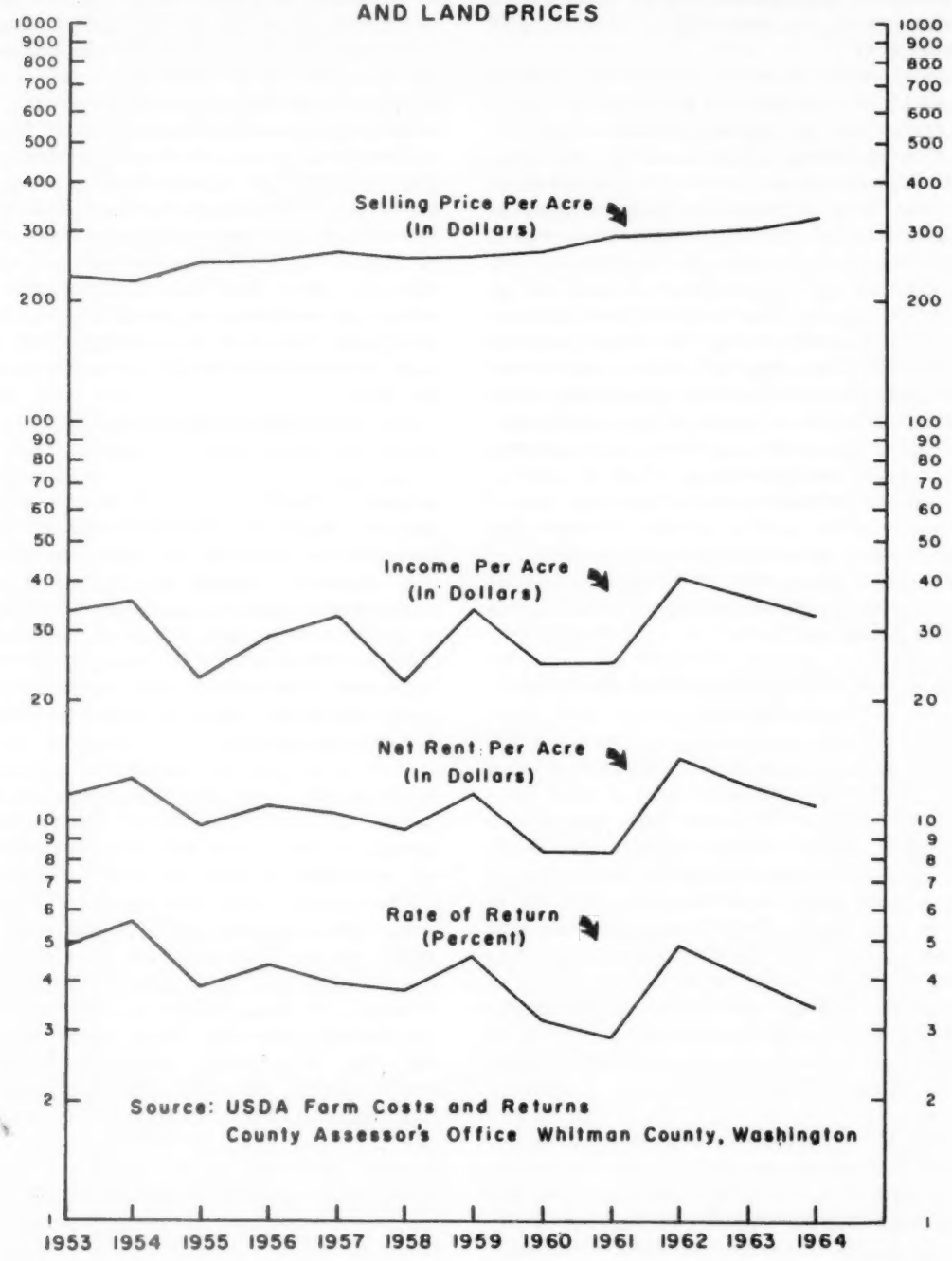
[6] The selling prices shown in chart 1 are weighted averages of annual transactions in Whitman County, Wash.

[7] The source of the historical series of returns is the USDA's Farm Costs and Returns. Net rent is computed to be 1/3 of crop revenue and Government payments minus 1/3 of the crop expenses (i.e., seed, fertilizer, and weed spray) and all property taxes on the land. This is an approximation of the standard lease in the region which allocates grain revenue and expenses on a 1/3-2/3 basis and pea revenue and expenses on a 1/4-3/4 basis.

[8] According to Farm Costs and Returns estimates, the average wheat yield increased from 46.8 bushels per acre during 1957-59 to 55.6 bushels for 1962-64. Much of this increase resulted from use of the Gaines wheat variety.

Chart 1

HISTORICAL TRENDS OF WHEAT-PEA FARM RETURNS AND LAND PRICES



produced an average net rent of approximately $23 per acre. At the then prevailing land price, this would have been a 7 percent average return. Alternatively, capitalized at 4 percent, such a return would have supported a land price of $570 per acre.

If most of the apparent divergency of trend between land returns and farmland prices in this region can be explained by the recent expectation of rising future returns, this simplistic explanation still leaves unanswered questions that arise in connection with the apparent paradox. Granted that farmer investors expect rising future returns over the long run, how are they able to bid up the price of land so high relative to current land returns? More specifically, how does the rising land price relate to the efficiency and expansion of farm operations in the region? Are farmers capitalizing prospective economies of scale in the prices they are bidding for land? Are financial resources being misallocated to the purchase of land at the expense of productivity-improving inputs? Then there is the question of whether the rising trend of land prices belies the assertion of farm interest groups that the wheat-pea farmer has not sufficiently shared the benefits of his growing productivity.

Selected Characteristics of Land Buyers

The farm real estate market in the wheat-pea region exhibits the universal trait of a low turnover rate. Judging from the sales records of the largest county in the region, about 1-1/2 percent of the region's cropland acres is exchanged each year. And the public offering of land is even more limited because about half the transactions in recent years have been between members of the same family. Little is known of the sellers' motivations but the survey disclosed that of the land supply available to outsiders in 1963-64, 42 percent of the transactions arose in connection with the settlement of an estate.

Typically, the land buyer was a large operator. Before acquisition of the land, the buyer operated an average of 1,000 cropland ares, 400 acres more than the region's average operation. But this is not to say that he was commensurably more wealthy than the typical wheat-pea farmer because, on average, 560 acres of the 1,000 acres were operated under lease. Therefore, even though the acreage acquired tended to be small in relation to the scale of his previous operation--the average purchase was 246 acres and the most frequent was 160 acres--the purchase often resulted in a substantial increase in the operator's landholdings.

Although the survey did not inquire into buyer motivations, it uncovered several factors that might explain the buyers' willingness to bid up the price relative to current land returns. In 80 percent of the transactions where the land acquisition expanded operations, the buyers indicated that their existing equipment would serve the additional acreage. Thus the often-mentioned desire of farmers to utilize equipment more efficiently was a factor in the demand for land.

The survey found that, including transactions where the buyer became a landlord, 40 percent of the purchases involved no expansion of operations. This is simply because a number of farmers bought land they were already farming under lease. In these instances, therefore, the only additional income for the buyer was the prospective land return itself. The frequency of such transactions suggests that farmers' concern with the future security and cost of their tenure on rented land partially explains their willingness to bid up the price relative to current land returns.

Most of the land purchasers were established farmers who knew the productivity of the land acquired. Only two of the 47 buyers were beginning farmers and only five were investors not intending to farm the land themselves. Of the remainder, more than four out of five buyers were either farming land adjacent to the acquisition or were farming the acquisition itself under lease. Such investors should require but a small, if any, margin of current return to compensate them for their uncertainty as to the risk of adverse short-run fluctuations. Furthermore, the risk itself has been low in this region. Only in 1960 and 1961 did the region's average net rent fall short of the 12-year average by more than $1.66 per acre (chart 1). Thus, this region's farmland would seem to warrant a lower rate of current return than land in areas more vulnerable to crop failure and price declines.

Test of Scofield's Hypothesis

In view of the relative infrequency of land offerings to the public, the sample of actual buyers just discussed is but a small fraction of wheat-pea farmers who would have been financially able to acquire land parcels of similar acreage and price during this period. The second sample of 35 farmers was utilized to determine the characteristics of the subset of the wheat-pea farmer universe that includes both the actual and potential demand for land parcels of the value offered. This sample is partitioned according to several rules to determine which of the sample farmers belong to the effective demand or potential investor subset of the universe. The hypothesis is tested by comparing the characteristics of this sample subset of 11 farmers with those of the remainder of the sample, which represents the region's farmers who are not effectively in the current market for land.

The assertion that the sample is representative of the region's family farm operations has its most tangible basis in the fact that averages of the sample farmers' operating characteristics compare closely with USDA's description of the region's representative farm. The following table compares 3-year averages of data from Farm Costs and Returns with corresponding 3-year averages from the sample. A direct comparison is somewhat misleading because the USDA average farm is assumed to be wholly owned while the sample average cropland acreage consists of leased as well as owned acres. Thus, even though the sample farm is 83 acres larger, its total revenue is smaller because it does not include the landlord's share. Similarly, the total investment is smaller because only acres owned by the operator are included. USDA data are adjusted to reflect a similar ratio of leased to total acres to minimize this distortion.

The sample can be used to verify the regional net rent--$12.35 per acre--estimated from data in Farm Costs and Returns. The 1962-64 average net rent for the sample, as determined from knowledge of each farm's income and leasing arrangement, is $12.04 per acre. By the same token, if the net rent of each sample farm is capitalized at the regional rate of return, 3.9 percent, the resulting average of sample land values, $308, is a close approximation of the recent average of actual market prices in the region.

The distribution of sample net rents is shown in chart 2. In part the sample variation reflects individual differences in the terms of lease. The distribution of leases computed with the terms of the region's standard lease is superimposed upon the original distribution to exhibit this effect. The distributions of other sample economic characteristics are exhibited

Item	USDA Farm Costs and Returns 1962-64 average	USDA adjusted for comparability	Sample 1962-64 average
Farm size	600 acres	--	683 acres
Acres owned	not available	--	289 acres
Acres leased	not available	--	394 acres
Percent fallow	28%	--	30%
Wheat yield per acre	55.6 bu.	--	53.5 bu.
Crop revenue--total	$27,346	$25,158	$25,768
Composition of revenue:			
Wheat	56%	--	60%
Peas	30%	--	25%
Barley	14%	--	15%
Total cash receipts	$30,052	$27,648	$30,165
Cash farm income	$16,884	$15,533	$15,814
Total investment in land, buildings, and equipment	$198,073	$104,550	$108,300

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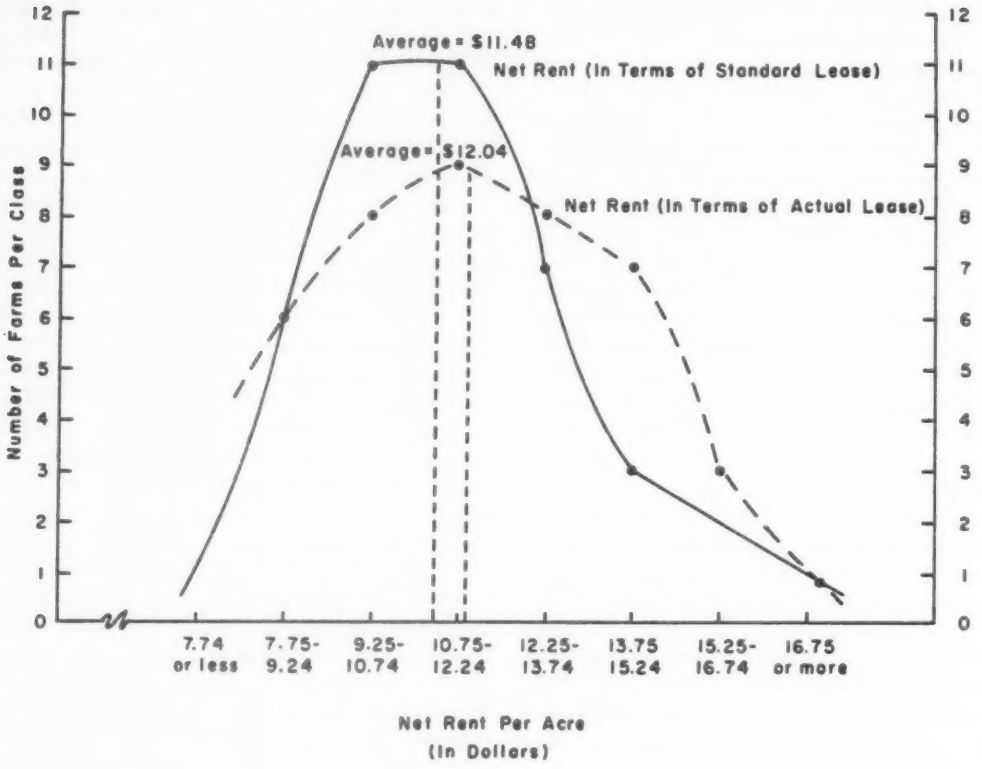
Chart 2

FREQUENCY DISTRIBUTION OF 1962-1964
AVERAGE NET RENTS IN THE WHEAT-PEA REGION



Source: Author's computations

in tables 1 and 2. Included is an estimate of the value of off-farm investments, determined by capitalizing each farmer's average 1962-64 income from such investments at 4 percent, and an assumed level of family consumption spending. With these and other generally available data it is possible to reconstruct the study's experiment. Alternatively, the sample may be partitioned on the basis of different assumptions from those used here.

A direct method is used to partition this sample. The net worth of each farmer is examined to determine his ability to make a 30 percent downpayment on a 250-acre purchase at the 1964 average market price of $320. Next a test is made of each operator's ability to carry the annual payment of a 6 percent, 20-year loan under the assumption that the purchase does not expand his operations. This test is repeated under the assumption that expansion occurs and unit costs decrease. Income and self-employment tax effects of the acquisition are taken into account and an allowance is made for family consumption.

Table 3 exhibits the results of these partitioning tests for the 35 farm operators in the sample. Twenty-five of the 35 farmers could make the $24,000 downpayment if they were

Table 1.--Selected economic characteristics of a representative sample of wheat-pea family farms [1]

Farm No.	Book value of machinery, equipment, and buildings	Off-farm investments [2]	Land at $320 per acre owned	Farm debt [3]	Net worth [4]
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1.....	59,041	2,175	172,800	152,302	81,714
2.....	32,724	105,100	396,160	218	533,766
3.....	12,156	0	25,920	19,472	18,604
4.....	16,617	2,101	120,960	92,850	46,828
5.....	22,894	950	246,400	57,507	212,737
6.....	13,423	1,975	76,800	26,272	65,926
7.....	20,330	76,900	0	73	97,157
8.....	5,466	11,025	256,640	27,853	245,278
9.....	17,357	12,600	23,360	19,363	33,954
10.....	15,545	125	0	8,691	6,979
11.....	13,032	189,850	208,000	1,454	409,428
12.....	20,822	23,625	171,520	11,799	204,168
13.....	17,640	30,525	0	0	48,165
14.....	9,860	2,925	0	9,800	2,985
15.....	13,329	775	62,400	17,817	58,687
16.....	18,043	118,400	221,760	39,980	318,223
17.....	26,597	4,150	25,600	28,817	27,530
18.....	11,127	4,625	88,320	34,417	69,655
19.....	15,628	26,900	57,600	4,545	95,583
20.....	14,643	8,075	31,680	0	54,398
21.....	22,142	86,700	178,880	1,364	286,358
22.....	21,879	0	85,760	34,871	72,768
23.....	23,531	3,105	106,560	98,705	34,491
24.....	2,700	1,350	0	5,527	-1,477
25.....	812	4,675	0	9,454	-3,967
26.....	5,807	1,725	82,880	26,162	64,250
27.....	8,147	150	89,280	27,799	69,778
28.....	22,807	4,925	76,800	11,799	92,733
29.....	9,940	29,325	76,800	0	116,065
30.....	9,141	0	148,800	49,089	108,852
31.....	11,835	350	81,920	727	93,378
32.....	13,251	0	0	0	13,251
33.....	5,154	23,975	12,800	0	41,929
34.....	8,693	7,950	106,240	8,018	114,865
35.....	11,599	0	0	5,618	5,981

[1] Data on 1962-64 averages.
[2] Investment income capitalized at 4 percent.
[3] Interest payments capitalized at 5 1/2 percent.
[4] Book value of machinery, buildings, equipment, off-farm investment, and land at $320 per acre, less farm debt.

Table 2.--Selected economic characteristics of a representative sample of wheat-pea family farms

Farm No.	Cropland			Family income and savings		
	Owned	Leased	Total	Average farm income 1962-64[1]	Assumed consumption	Assumed savings or dissavings
	Acres	*Acres*	*Acres*	*Dollars*	*Dollars*	*Dollars*
1	540	862	1,402	4,645	8,000	-3,355
2	1,238	0	1,238	33,386	9,500	23,886
3	81	1,030	1,111	11,511	17,500	-5,989
4	378	800	1,178	15,952	6,000	9,952
5	770	158	928	13,369	3,500	9,869
6	240	515	755	9,406	8,500	906
7	0	916	916	15,775	10,500	5,275
8	802	81	883	9,229	6,000	3,229
9	73	761	834	8,787	3,500	5,287
10	0	767	767	7,436	7,000	436
11	650	200	850	28,395	9,500	18,895
12	536	228	764	16,468	13,000	3,468
13	0	716	716	13,989	8,000	5,989
14	0	671	671	6,940	8,000	-1,060
15	195	522	717	7,206	9,000	-1,794
16	693	0	693	23,196	9,000	14,196
17	80	695	775	7,776	7,500	276
18	276	390	666	6,065	7,500	-1,435
19	180	480	660	16,075	8,000	8,075
20	99	550	649	5,325	3,500	1,825
21	559	96	655	17,396	8,500	8,896
22	268	337	605	9,335	8,500	835
23	333	100	433	2,423	6,500	-4,077
24	024	516	516	7,107	7,500	-393
25	0	515	515	6,530	6,000	530
26	259	179	438	7,905	8,500	-595
27	279	201	480	6,534	8,000	-1,466
28	240	162	402	986	7,000	-6,014
29	240	236	476	5,806	3,500	2,306
30	465	0	465	4,530	8,000	-3,470
31	256	153	409	5,507	7,000	-1,493
32	0	396	396	4,452	6,000	-1,548
33	40	267	307	10,973	7,000	3,973
34	332	0	332	6,050	6,000	50
35	0	312	312	3,699	7,000	-3,301

[1] Farm income after self-employment tax and Federal income tax.

Table 3.--Sample farmers' ability to finance a land purchase

Farm No.	Financial data per acre of land acquired				Ability to make down payment	Ability to carry contract	
	Principal and interest payment[1]	Net rent[2]	Family savings or dissavings	Additional income with expansion		Net rent and savings	Income from expansion & savings
	Dollars	*Dollars*	*Dollars*	*Dollars*			
1.....	27.14	8.02	-13.42	19.13	Yes	No	No
2*.....	19.53	20.52	95.54	26.76	Yes	Yes	Yes
3.....	27.90	10.31	-23.96	23.40	No	No	No
4*.....	27.17	15.14	39.81	31.64	Yes	Yes	Yes
5*.....	27.57	10.08	39.48	21.86	Yes	Yes	Yes
6.....	27.21	13.09	3.62	25.20	Yes	No	Yes-No
7*.....	19.53	8.10	21.10	18.97	Yes	Yes	Yes
8.....	24.06	9.66	12.92	18.01	Yes	No-Yes	Yes
9.....	27.90	9.26	21.15	21.73	No	Yes	Yes
10.....	27.90	12.41	1.74	26.62	No	No	Yes-No
11*.....	19.53	14.06	75.58	26.35	Yes	Yes	Yes
12*.....	19.66	13.49	13.87	30.04	Yes	Yes	Yes
13*.....	19.53	11.15	23.96	24.80	Yes	Yes	Yes
14.....	27.90	11.81	-4.24	24.40	No	No	No
15.....	27.63	7.67	-7.18	18.97	Yes	No	No
16*.....	19.53	15.72	56.78	29.74	Yes	Yes	Yes
17.....	27.90	11.63	1.10	26.43	No	No	No-Yes
18.....	26.29	8.90	-5.40	19.55	Yes	No	No
19*.....	19.53	14.66	32.30	32.25	Yes	Yes	Yes
20.....	25.08	8.64	7.30	17.83	Yes	No	No-Yes
21*.....	19.53	13.52	35.58	28.67	Yes	Yes	Yes
22.....	27.90	10.61	3.40	28.20	Yes	No	Yes
23.....	27.90	10.64	-16.31	25.25	No	No	No
24.....	27.90	12.09	-1.57	28.47	No	No	No-Yes
25.....	27.90	10.14	2.12	18.05	No	No	No
26.....	27.30	11.51	-2.38	26.87	Yes	No	No
27.....	27.85	9.57	-5.86	23.98	Yes	No	No
28.....	26.19	10.95	-24.06	21.10	Yes	No	No
29.....	19.53	9.25	9.22	20.80	Yes	No-Yes	Yes
30.....	27.90	8.81	-13.88	23.51	Yes	No	No
31.....	27.78	11.60	-5.97	17.12	Yes	No	No
32.....	27.90	11.57	-6.19	23.85	No	No	No
33*.....	19.53	12.08	15.89	27.30	Yes	Yes	Yes
34.....	25.13	9.82	.20	26.24	Yes	No	Yes-No
35.....	27.90	10.34	-13.20	21.36	No	No	No

* Member of 11-farm potential investor subset.

[1] Average per acre payment $24.96 (interest $10.65 and principal $14.31).

[2] Adjusted to standard lease and shown before income and self-employment taxes.

able to borrow as much as 50 percent of the book value of their fixed assets to apply to this amount. Ten of the 25 had sufficient off-farm investments to make the downpayment without borrowing against fixed assets. Indeed, five of the 10 could finance the entire $80,000 acquisition by liquidating off-farm investments.

In other columns of the table the annual per acre payment on a loan ranging from $56,000 for those who could make the downpayment to $80,000 for those who would have to borrow the entire amount may be compared with each farm's net rent per acre, adjusted to terms of the standard lease, and with family savings expressed relative to the acres of land to be acquired. The comparison of these three columns reveals which farmers would be part of the effective demand for land where the downpayment is not a factor and no expansion occurs. Only one farm yielded a net rent sufficient to carry the annual payment and it was a marginal case. On average, the landlord's share of farm income on 250 acres would just carry the interest payment. Thus family savings would have to be used to accumulate an equity in the land acquired.

Significantly, more than two-fifths of the farm operators had negative savings. In these instances the existing net income after taxes was not enough to support a level of consumption that was assumed to be $3,500 for a single person, $6,000 for a couple, and $400 for each child. Few operators with less than 700 acres had savings by these criteria and several larger farms did not because they were partnerships or because large families were involved. Moreover, only 12 of the 20 farms with positive savings had enough to make up the difference between the annual payment and the net rent from 250 acres. Two more families with positive savings could carry the payments if they were to cut consumption spending $1,000 below the assumed level.

Included among these 14 farmers are 10 who could make the downpayment without borrowing against fixed assets. Only three of the remaining 15 who could make the downpayment could carry the payment with existing savings and the additional income from the landlord's share. But one of the 10 farmers who could not make the downpayment could carry the annual payment on a 100 percent loan.

Since a majority of land transactions in this period resulted in an expansion of the investing farmer's operations, a test is made of the farm operator's ability to carry the annual payment with existing savings and the additional income from expansion. Crop revenue and variable expenses per acre were assumed to be constant over the expanded acreage and it was assumed that no additional investment in buildings and equipment was required. The resulting addition to net income after taxes, including net rent as well as returns to other productive factors, is shown in the fourth column of table 3. Including six marginal cases, 21 of the 35 farm operators could carry the payments of the land acquisition if they could augment personal savings with the additional income from expansion under conditions of decreasing unit costs.

The 21 include the 14 farmers who could carry a nonexpansion land loan with savings and net rent. The two farmers who were marginal cases in that test can easily carry the payments under these assumptions. The seven additional farmers include four who would have to borrow against fixed assets to make the downpayment and three who could not make the downpayment even by borrowing. Moreover, all but one of the seven are marginal cases in this test. Therefore, if these six are rejected as prospects for a loan, the group that could afford to finance an expansion investment is virtually the same group that could afford to buy land they are already operating under lease.

Combining the results of the three tests, one of the 15 farmers who could carry the loan with the additional income from a 250-acre, decreasing-cost expansion, could not make the downpayment. Moreover, only 11 of the remaining 14 could make the downpayment and carry the loan on a nonexpansion acquisition without impairing consumption, if not the effectiveness of the farm operation. By a stringent application of the financial criteria set forth here, then, less than one-third of the sample farm operators are unequivocal prospects for the purchase of a 250-acre land parcel at the average market price of 1964.

A comparison of this 11-farm subset with the remainder of the sample reveals striking differences that tend to confirm Scofield's hypothesis. In common with the actual investors surveyed, the 11 potential investors farm an

above-average acreage. The subset averaged 810 cropland acres, about two-fifths of which is farmed under lease. Although this average is almost 200 acres smaller than the 1,000-acre average for the farm investors surveyed, the average wealth and incomes of the 11 farms probably was not much, if any, less than that of the actual investors, whose operations included 560 acres under lease.

In contrast, the remaining farms of the sample averaged 625 cropland acres.

The disparity in wealth between the 11-farm subset and the remainder of the sample is even greater than the difference in farm size would indicate. The average net worth for the 11-farm group is approximately $209,000 while that of the remaining 24 operators is $60,000. This difference exists in part because the 11 farmers owned an average of 459 acres while the remainder averaged 211 owned acres. Moreover, the average investment in buildings and equipment for the 11 large farms was $3,201 greater and the outstanding debt averaged about $6,000 a farm less than for operators not effectively in the market for land. Perhaps the most interesting difference is the fact that the potential investor group had an average of $62,000 in off-farm investments compared with $4,200 for the remaining farmers.

The greater wealth of the potential investor subset is accompanied and possibly explained by greater than average farming success. The 1962-64 average net rent, as adjusted to terms of the standard lease, is $13.50 per acre. The remaining 24 operators averaged $10.34 per acre.[9] Judging from this sample, farmers who were effectively in the market for land at the 1964 price level could expect a slightly above average current return of 4.2 percent. The 24 farmers who were not in the market had a current return of only 3.3 percent.

Because of their farming success, greater wealth, and larger scale of operations, the 11-farm subset had much higher incomes. The average cash income per farm for the 3 years was $27,884 for this subset and $10,282 for the remaining operators. Net farm income after taxes averaged $18,634 and $6,466 respectively. Given the assumed level of consumption spending, the average annual flow of savings generated by the 11 farms was a remarkable $10,200.[10] For the remaining 24 operators the average income, net of capital depreciation and taxes, annually fell short of the assumed consumption level by more than $800.

These financial contrasts are so marked that they tend to justify the partitioning assumptions of the study as well as confirming Scofield's hypothesis. If it were assumed that the offering price of land were lower, the terms of financing easier, or the size of parcel offered smaller, many more of the sample operators might be included in the potential investor subset. But as a matter of fact, the effective demand for land in this region is probably limited to farmers with the characteristics of the chosen subset. This is simply because the supply of land for public sale is so limited that any parcel is apt to have several farmers bidding for it. And though only a minority of wheat-pea farmers are wealthy, these potential investors are sufficiently numerous that one or more of them would be operating in the immediate locality of sale.

Summary and Conclusions

In the wheat-pea region as in the Nation, there has been a disparity between the trends of land prices and farm returns. But much of the land price rise has occurred in recent years when the expectation emerged that future land returns would increase markedly because of improved yields and the lessening of production controls. Moreover the use of regional averages to depict these trends is misleading. As Scofield surmised, the average market price of this region's farmland reflects the competitive bidding of a minority of wheat-pea farmers who are larger, wealthier, and more successful than average.

[9] A test of the statistical significance of the difference between the two average net rents was made. The $3.16 difference is significant at the 5 percent level of confidence. The difference is explained by higher crop revenue per acre and by lower crop expenses per acre. Property taxes per acre vary little from farm to farm because of assessment practices. The crop revenue of the 11-farm subset was $6 per acre higher and their crop expenses were $3 per acre lower than those of the remaining farmers. Both component differences are statistically significant at the 5 percent level.

[10] Three of the 11 farms are partnerships. Even so the average saving per family is $8,300 annually.

The disparity of income between this small group and the majority of the region's family farms, not to mention part-time farms, is so great that land value cannot be viewed as a valid indicator of the region's general economic welfare. For that matter, it is not a valid indicator of the average wealth of regional farm operators because they lease so much of the land they operate. At the same time the region's low current rate of land return does not signify a general misallocation of resources to the bidding up of the price of land. If the large investing farmers are not spending enough for other productive inputs, the sheer magnitude of their off-farm investments and annual savings argues that the deficiency can seldom be attributed to the budgetary constraint imposed by a land purchase. For the majority of farmers not in the effective demand for land, however, the close competition of funds for operational and consumption needs may signify that they are not spending sufficient amounts for equipment, fertilizer, and other productivity-increasing inputs. Indeed, the significantly lower land returns being earned by these farmers may reflect such a deficiency.

Finally, the findings suggest that the desire of farmers to reap the additional income and prospective economies from expansion is not an important reason for the land price being so high relative to current returns. In the first place, as attested to by both samples, most of the expansion of operations in this region has been accomplished with leased land. Secondly, of the land transactions surveyed, 40 percent involved no expansion of operations. Moreover, the partitioning of the second sample revealed that the subset of the wheat-pea farmer universe that is effectively bidding for land offerings at current prices can well afford to buy land on the basis of its return alone. To put it more forcefully, the subset of potential farmer investors cannot be enlarged significantly by assuming that a farmer can meet his annual loan payment with the additional income from expansion under decreasing costs. If the wheat-pea farmer cannot afford to buy land he is presently operating under lease he cannot afford to expand his operation with a land purchase.

An Iterative Linear Programming Procedure for Estimating Patterns of Agricultural Land Use[1]

By Howard C. Hogg and Arnold B. Larson

THE BENEFITS DERIVED from an irrigation or land development project depend on the pattern of crop production on project land. In some instances, all the land of a particular quality in a project area can be devoted to the specialized crop which budget analysis shows to have the highest net return, without perceptibly affecting the price of the crop. This is because the added production represents an insignificant part of the total supply. In such instances, project planning can usually proceed on the assumption that land in a particular classification will be devoted to the crop showing the highest net return.

In other instances, however, the additional production of a crop on land served by a project may be large enough to reduce the price of the product below the level that would be realized if there were no production of the crop on this land. For example, the Cachuma Project of the U.S. Bureau of Reclamation at Goleta, Calif., greatly increased the potential supply of irrigated lemon and avocado land. If all the land in the project area well suited to these crops had been planted to them, the product prices would have declined considerably. Many similar situations could be cited. If the public agencies responsible for developing these projects ignore the effect of production on price, they will obtain poor estimates of the resultant crop pattern and will overestimate direct project benefits.

In many cases, an irrigation project is designed to serve an area where there are a number of land classes with differing yields and costs of production for each of a number of crops which might be grown on project land. If some or all of the potential crops are likely to decline in price because of the production on project land, the estimation of the pattern of crop production becomes complex. Classical rent theory suggests that a static competitive equilibrium is achieved when each land class earns the same rent or net return for each crop grown on it. The theory requires that all land earning rent be fully utilized. Marginal land need not be fully utilized since, by definition, it does not earn rent. An added requirement is that a crop must have the same price on all land classes where it is grown to supply any given market. Reaching an equilibrium under these conditions requires the simultaneous adjustment of prices and production for all crops while observing the imposed restraints.

The Molokai Project, at Hoolehua on the island of Molokai, Hawaii, affords an unusually clear example of the need to consider the effect on product prices of production on land served by an irrigation project. About 1,000 acres of high-quality land, previously uncultivated, are to be served with irrigation water from the project, and additional areas will be supplied with supplemental water. The land is well suited to vegetable crop production, and since it is possible to develop relatively large, highly mechanized farms (in comparison to existing vegetable farms in the State), the cost of producing many crops should be lower than in other areas of production. The consequent increase in supply will probably lower prices in the small Honolulu market, since the supply from project lands will be a sizable portion of the total. Most of the Molokai Project facilities have been built but not all of the land has been opened for development. In this paper we present an outline of a method used for determining the equilibrium pattern of land use

[1] Hawaii Agricultural Experiment Station, Technical Paper No. 889.

for this project. The criteria for this equilibrium pattern of land use are identical to those given earlier for classical rent theory.

The Estimating Procedure

The equilibrium land use pattern was estimated by successive approximation in a linear programming model that maximized net returns to the lands served by the project. An initial solution was obtained in which the per acre net return to each crop grown on each land class was predicated on the price which that crop would command if it were the only crop grown on project land. This initial price depends on the demand curve for the product, on the product supply curve pertinent to existing producers (those presently producing the crop on land not served by the project), and on the amount of the crop which can be grown on project land without depressing the price below the cost of production on marginal land (for that crop) within the project area. The initial prices are lower than or equal to the equilibrium prices, since competition among the crops for use of the land in the project should usually raise the price and reduce the quantity of each crop produced. Hence net returns, which comprise the c-values in the objective function of the linear program, are also lower than those expected to prevail in the area.

The initial prices were adjusted upward until supply equaled demand for all crops. For crops that could not compete for project land the price was determined by the intersection of the demand curve and the supply curve for existing producers. For crops that could successfully compete for project land, the supply forthcoming from existing producers was augmented by production from project land. At each step of the adjustment process, each crop earned the same rent as any other crop on any land class where both were grown. Each adjustment was a progressively diminishing fraction of the difference between the price of a crop at that stage of the adjustment process and the price of the crop without project production.

There were two types of restriction in the simplex table used in the linear programming model: acreage of each land class, and quantity of each crop produced on project land. The real activities were production of each crop on each land class. If the actual quantity of a crop produced was less than the quantity needed from the project to yield the market price shown for the crop, a portion of the quantity needed would be in disposal. This was the signal that price of that crop was too low and should be raised in the next adjustment. If acreage of a land class was in disposal, and if any crop earned rent on this land class, it was the signal that the price of that crop was too high and must be lowered in the next adjustment. When both tests were met within a threshold of tolerance, the equilibrium position had been reached.

Figure 1 illustrates steps in the solution of a two-crop, two-land-class problem. Diagram (a) shows the initial solution for crop 1. The supply curve SA has been shifted in two discrete increments, reflecting production on land classes 1 and 2 as price of the crop rises to the point where production on project land is possible. Note that all of land class 1 and a portion of land class 2 would be devoted to crop 1 if it were the only crop grown. The price of crop 1 at this point is PA_2, which is the cost of production on land class 2.

Diagram (b) shows the initial solution for crop 2. Without competition from crop 1, crop 2 will be grown only on land class 1, and the cost of production on this land class determines the price at this point in the solution.

In the initial solutions, land class 1 is used for both crops. In subsequent iterations of the computer program, the two crops compete on land class 1, successively increasing crop prices until the demand restriction reduces quantities demanded to levels achievable with the available amount of land. In the final solutions as shown in diagrams (c) and (d), the two crops share land class 1, but only a portion of land class 2 is used by crop 1. The rent earned by crop 1 on land class 1 is $PA_2 - PA_1$ per unit of product and the rent earned by crop 2 on land class 1 is $PB_2 - PB_1$ per unit. These price differences times the respective yields give the per acre rents, which must be equal for the two crops. Since not all of land class 2 is used, it is marginal and earns no rent. The curves SA' and SB' appear to be

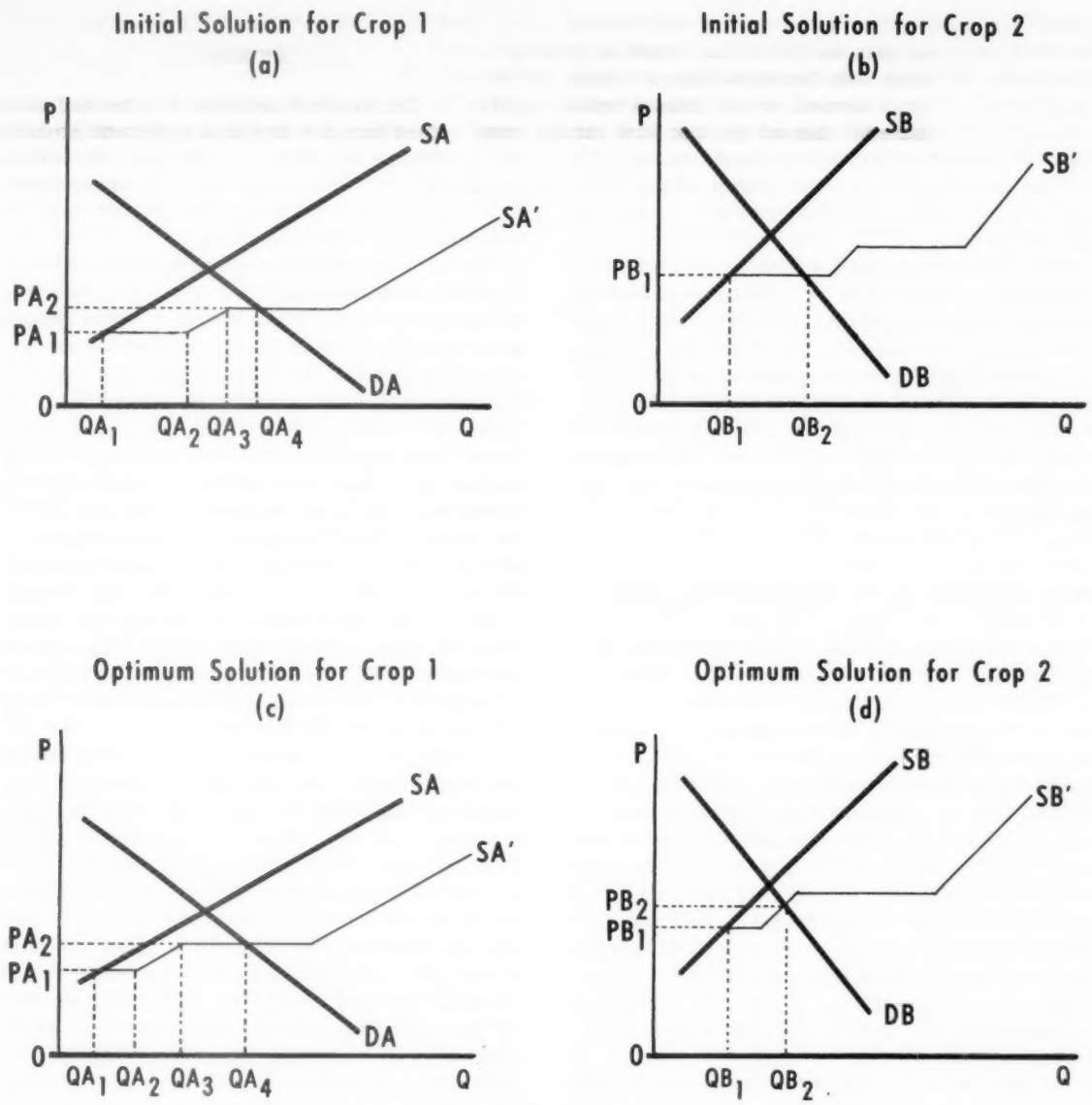


Figure 1.--Graphic representation of a two-crop, two-land-class problem.

stepped supply curves, but it should be observed that they relate only to the single final equilibrium point. That is to say, a shift in one of the demand curves would not result in a new equilibrium at the intersection of the new demand curve and the existing S' curve, but would normally lead to a shift in the S' curve as well.

It may be seen that the method employs a linear programming procedure, embedded in an adjustment procedure that systematically alters the c-values of the objective function and the levels vector as product prices and quantities are made to converge to their equilibrium values. The land use pattern at each step of the adjustment process was determined by the simplex

procedure which maximized net revenue based on then current prices. When the price of a crop was increased because supply did not equal demand, or was reduced because supply exceeded demand (so that land earning rent was in disposal), all currently or potentially competing crops had their prices changed so that they earned the same amount of rent on shared land.

The final solution gives prices, total quantity produced of each crop on project land and by existing producers, and the pattern of land use within the project. The Molokai Project application for which the method was specifically developed (3)[2] did not fully challenge the procedure as only two land classes were involved, therefore, a hypothetical problem and solution are given for illustrative purposes in the appendix.

Features of the Computer Program

The computer program used in the study was written in Fortran IV for the IBM 7040. As presently written, it can accommodate 10 crops and 10 land classes, but of course it can easily be expanded to larger dimensions. The most difficult situation to deal with, and the one requiring the greatest number of iterations, is that in which several crops compete on a given land class. The program has been tested for five crops on three land classes, where four of the crops competed on one land class. A solution was obtained in approximately eight minutes of computer time. In this solution the program required 50 iterations with each iteration representing one solution of the simplex program.

At present, the tolerances built into the test of whether supply equals demand are 0.1 acre of land or 1.0 pound of product. While these are probably small enough for most practical purposes, they could be reduced to any desired level of precision with some increase in computer time needed. Since any level of precision can be achieved by practical means, the solution can be viewed as exact.

[2] Underscored numbers in parentheses refer to items in the References, p. 24.

Some Limitations and Special Problems

The essential contribution of the method outlined here is to provide a systematic procedure for modifying the objective function and levels vector of a linear program. Therefore, the final result shares all of the limitations inherent in linear programming.

The demand curves and the supply curves of existing producers used in the program are unrestricted as to form, but they must denote price-quantity relationships and are assumed to be independent. Factors other than quantity that might affect price must be treated as shift variables outside the program. Since the demand and supply curves are estimated from market data they may reflect dynamic factors which may lead to nonequilibrium estimates. The supply from producers on project land, on the other hand, is based on the assumption of static equilibrium in which producers expand output to the point where net profit, other than rent, is zero. To this extent, the two sets of estimates may be inconsistent. Specialized producing units are implied because fixed costs are allocated by enterprise.

It may well be supposed that some factor other than land might be restrictive. For most economic analyses of the type treated here, the price of the ostensibly restrictive factor could be raised to the point where the factor is no longer restrictive. Factor demand curves could be constructed by varying factor prices and determining the quantities used at each factor price from successive program solutions. Another approach would be to find the pattern of land use that would emerge without added restrictions, and then use this information to estimate a new pattern with the additional restrictions, using a standard simplex procedure. A comparison of the results would indicate the degree of distortion resulting from the restrictive factor.

Relationship to Other Available Methods

Interregional equilibrium models are closely related to the procedure outlined here. This

similarity exists because the regions of an interregional model are usually treated as areas of uniform physical productivity, and thus are analogs of land classes. Most of the early interregional studies incorporating demand functions were restricted to a single commodity. Apparently, the earliest empirical study of this type was published by Fox (1) in 1953. His model employed a demand function for livestock feed but assumed livestock numbers, livestock prices, and feed production to be fixed in each region. The solution gave the price and consumption (per animal unit) of feed in each region and the pattern and volume of interregional feed shipments. Judge and Wallace (4) formulated an equilibrium model of the livestock economy, in 1959, which incorporated product demand curves for a single commodity and fixed regional product supplies. Subsequent work appears to have concentrated on generalizing this basic model to include factor as well as product shipments and prices (5, 6).[3] In 1964, Takeyama and Judge (8) presented a model that allows estimation of interregional production patterns and commodity flows and accommodates product supply and demand relationships for several commodities. Their formulation is not suited to the present problem because it assumes independent regional supply curves that are determined outside the model.

Superficially, the procedure outlined here appears to be closely related to reactive programming as developed by Tramel and Seale (9). There are, however, several significant differences between the two models. Our model incorporates land restrictions, by quality, as well as the quantity restrictions of reactive programming. Also, in our model it is possible to determine the quantity that will be supplied by existing producers and by producers on project lands directly from the model. Finally, the Tramel-Seale model yields an approximate solution while our model specifies the exact solution within the limits of accuracy achieved in the land classification system, budgeted production costs, the estimated market demand and supply functions for existing producers, and the tolerance levels specified.

An alternative to the present procedure for including demand functions for several commodities has been described by Yaron and Heady (10). Their procedure is based on a stepped approximation of the net revenue function with a solution achieved by considering each step of the function as a separate activity (a subactivity of the activity or commodity being considered). The difficulty with this procedure is that the solution is approximate and, as formulated, the objective is to maximize profit, which does not incorporate our equal rent criterion for a competitive equilibrium. Although the possibility was not explored, perhaps their procedure could be recast as a rent minimization problem as suggested by Smith (7).

Appendix--An Example

This example illustrates the data required and the results obtained from the computer program used in this study. In the example, there are five crops which might be grown in a project area consisting of three land productivity classes. The commodities are sold on a single market.

The required input data are given in tables 1 and 2.

The initial solution to this problem is given in tables 3 and 4. Table 3 provides the initial acreages and rents while table 4 contains initial prices and quantities.

The final solution of this problem resulted in the pattern of land use and per acre rents indicated in table 5. Equilibrium product prices and quantities are given in table 6. The complete program and a manual of instructions for its use are available from the authors.

[3] Fox and Taeuber (2) published a study in 1955 which allowed a single factor, feed, and livestock products to be shipped between regions. This study can be viewed as perhaps the first to consider multiple commodities.

Table 1.-- Market demand functions and supply functions for existing producers[1]

Crop	Demand functions		Supply functions	
	Price intercept	Slope	Cost intercept	Slope
Crop 1.....	250	-.003	-1,125	0.25
Crop 2.....	300	-.05	-33,330	17.0
Crop 3.....	400	-.08	-1,143	1.4
Crop 4.....	250	-.03	-1,500	2.0
Crop 5.....	300	-.03	-2,500	1.0

[1] Prices are estimated in dollars per 1,000 pounds and quantities are in 1,000-pound units. In this example the demand and supply curves are linear.

Table 2.--Production costs and yields by land class[1]

Crop	Production costs per acre			Per acre yield		
	Land class 1	Land class 2	Land class 3	Land class 1	Land class 2	Land class 3
	Dollars	*Dollars*	*Dollars*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Crop 1.....	7,000	6,500	6,000	50	45	40
Crop 2.....	5,000	4,500	4,000	55	50	45
Crop 3.....	7,000	6,500	6,000	40	30	20
Crop 4.....	10,000	9,500	9,000	100	90	80
Crop 5.....	10,500	10,000	9,500	95	90	85

[1] In this example, land classes 1, 2, and 3 show progressively lower yields for all crops, but this is not a requirement of the program.

Table 3.--Initial acreages and rents for five-crop, three-land-class problem

Crop	Acreage			Per acre rents		
	Land class 1	Land class 2	Land class 3	Land class 1	Land class 2	Land class 3
	Acres	*Acres*	*Acres*	*Dollars*	*Dollars*	*Dollars*
Crop 1.....	550.0	57.9	--	222.22	--	--
Crop 2.....	--	--	50.1	--	--	--
Crop 3.....	--	--	--	--	--	--
Crop 4.....	--	--	--	--	--	--
Crop 5.....	--	--	--	--	--	--
Total available.....	550	100	100	--	--	--

Table 4.--Initial product prices and quantities

Crop	Product prices	Quantity supplied by project producers	Total quantity supplied
	Dollars per 1,000 pounds	*Pounds*	*Pounds*
Crop 1.....	144.44	30,107,408	35,185,186
Crop 2.....	88.89	2,256,405	4,222,222
Crop 3.....	175.00	1,871,071	2,812,500
Crop 4.....	100.00	4,200,000	5,000,000
Crop 5.....	110.53	3,705,263	6,315,789

Table 5.--Final acreages and rents for five-crop, three-land-class problem

Crop	Acreage			Per acre rents		
	Land class 1	Land class 2	Land class 3	Land class 1	Land class 2	Land class 3
	Acres	*Acres*	*Acres*	*Dollars*	*Dollars*	*Dollars*
Crop 1.....	467.2	100.0	6.9	514.15	262.73	11.32
Crop 2.....			50.0			11.32
Crop 3.....	42.5			514.15		
Crop 4.....	40.3			514.15		
Crop 5.....			43.0			11.32
Total available.....	550	100	100			

Table 6.--Equilibrium product prices and quantities

Crop	Product prices	Quantity supplied by project producers	Total quantity supplied
	Dollars per 1,000 pounds	*Pounds*	*Pounds*
Crop 1.....	150.28	28,137,882	35,185,186
Crop 2.....	89.14	2,251,360	4,222,222
Crop 3.....	187.85	1,701,219	2,812,500
Crop 4.....	105.14	4,026,047	5,000,000
Crop 5.....	111.90	3,658,173	6,315,789

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Book Reviews

Economic Development of the North Atlantic Community: Historical Introduction to Modern Economics

By Dudley Dillard, Prentice-Hall, Inc., Englewood Cliffs, N.J. 726 pages, 1967. $10.95.

ALTHOUGH FULLY AWARE of the hazards of economic forecasting, I venture to predict that this book by Professor Dudley Dillard of the University of Maryland will prove to be a landmark in the teaching of economics, particularly in those schools where proper emphasis is given to economic history.

To quote from the preface: "This book traces the development of the North Atlantic economy from its medieval origins to the present. It covers most of the topics usually treated in conventional economic histories of Europe, on the one hand, and the United States, on the other hand. In two important respects, however, it differs from traditional books in economic history. First, the European and American economies in their evolution are viewed as two closely related phases of a common development. Second, economic analysis is used more extensively than in conventional books on economic history."

Dillard's treatment attains an unusual degree of unity and coherence by following a number of themes throughout the study. These include "(1) the importance of the concept of an economic system, (2) capitalism as a monetary economy, (3) the accumulation of capital, (4) the changing basis of economic development from medieval art to contemporary science, and (5) the North Atlantic community as the appropriate geographical and cultural unit to study in order to understand the economic development of western Europe and the United States." In addition, Dillard writes exceptionally well and there are few chapters that are not highly readable.

It is impossible, in a short review, to do full justice to the broad scope and rich content of this book. Part I, "Roots of the Atlantic Economy," covers briefly such familiar topics as the expansion of trade, the decline of the handicraft and manorial systems, and the rise of banking, industry, and the towns. Needed reemphasis is given to "the spirit of capitalism" and its relation to the Protestant ethic.

Part II, "Founding the Atlantic Economy," focuses on the accumulation of capital through the expansion of foreign trade, the putting-out system in industry, agricultural enclosures, the price revolution generated by the flow of American treasure to Western Europe, and the development of organized capital markets. Mercantilism gets special attention, and Professor Dillard gives a convincing defense of this much maligned system as having provided the necessary foundations of capitalism through such contributions as the elimination of barriers to internal trade, improved currency systems, uniform commercial laws, and critical investments in overhead capital such as roads, canals, and harbors. Toward the end of this period, the United States became independent and a part of the Atlantic community, at about the same time that mercantilism was declining and laissez-faire emerging.

Part III, "Industrializing the Atlantic Economy," is the longest in the book. It explores the advent of the Industrial Revolution in England and traces its spread to France, Germany, and the United States. The dominant theme is "the marriage of science with capitalism to produce new wealth on an unprecedented scale." Also recounted at some length is the growth of large-scale enterprise, the money markets, and organized labor. Finally, there are chapters devoted to the problems of agriculture in an industrialized world and to evaluating the consequences of economic imperialism for the backward areas of the world. On the theoretical side, the classical theory of distribution, as well as the controversies between Ricardo and Malthus on the Corn Laws and the possibility of general overproduction in a capitalistic economy, receive special attention.

Part IV, "Integrating the Atlantic Economy," covers a lot of ground. Beginning with the economic disarray of Europe after World War I--including the war debts, reparations, hyperinflation in Germany, and widespread social discontent--Professor Dillard moves on to boom and stagnation in the United States during the twenties; the Great Depression and the New Deal; and the phenomenal economic expansion of Western Europe and the United States following World War II. He concludes with a chapter on the economic basis of a Great Atlantic Society, expressing optimism about its future, despite the Cold War and indications of national and regional protectionism. Throughout this whole group of chapters, stress is placed on the rise of national economic planning as a successor to economic liberalism, which affords an opportunity for introducing the emergence of Russia as an economic rival to the West. The influence of John Maynard Keynes on economic theory and policy in the capitalistic countries is continually evident.

The high scholarly level which characterizes the book as a whole is maintained in Part IV, but the five concluding chapters exhibit the difficulties encountered by the historian when he attempts to deal with recent or contemporary events. A high degree of selectivity is involved and the treatment of many topics is necessarily tentative. As an example of the first difficulty, Professor Dillard has chosen to describe the Marshall Plan primarily in terms of its contribution to European balance-of-payments problems, but this involves leaving out the very important story of the scope and nature of the American aid and the ways in which it brought about recovery and expansion in the participating countries. As an example of the second, it is still too early to say much about the long-run implications of the Common Market, the Kennedy Round, and various efforts to achieve a better international monetary system.

This book can be put to a variety of uses. It certainly provides an excellent basic introduction to the economic history of the West as well as an invaluable guide for graduate students. In this connection, I recall my own struggles to form a coherent picture from the writings of such people as Mantoux, Clapham, Usher, Gras, and the Hammonds, to mention only a few. Many chapters should provide excellent supplementary readings for introductory courses in economics using conventional texts. The subtitle "Historical Introduction to Modern Economics" seems to imply that this book may also serve as the basis of a first course in economics. I am not so sure of this, as a very large amount of outside reading in economic theory would be required for an adequate understanding of many of the theoretical concepts that Professor Dillard employs. The ideal situation, it seems to me, would be for the beginning student to take a course in economic history using this book concurrently with an introductory course along conventional lines.

J. P. Cavin

Agricultural Development and Economic Growth

Edited by Herman M. Southworth and Bruce F. Johnston. Cornell University Press, Ithaca, N.Y. 608 pages. 1967. $12.

THIS BOOK consists of 14 chapters by different authors and one or two commentaries following each chapter except the first. The editors state in the preface that the book was "conceived in the belief that enough study has now been given to the economics of agriculture in the context of development, and enough experience has been gained to justify a stock-taking." In implementing this objective the book brings together the thinking of some of the top scholars working in the area of foreign economic development. Because of the numerous authors and the breadth of the topics covered, any brief review of this book cannot do justice to the ideas presented both by the authors and by their highly qualified critics.

The editors start the book with a chapter on "Economic Development: Problems and Issues." John Mellor follows with a chapter aimed at setting out a theory of economic development. This discussion stresses the interrelationships between agriculture and other economic sectors.

Key interrelationships which must be dealt with in a theory of economic development and which other authors reiterate in their chapters

are (1) the needed shift of labor from agriculture to other sectors and the provision of food supplies to these other sectors, (2) the contribution of agricultural capital to the creation of nonfarm jobs, (3) the important market that agriculture represents for the developing industrial sectors, and finally, (4) the reliance of a highly productive agriculture on substantial inputs originating outside of agriculture. Following a good review of the literature on development theory, Mellor states, "The key issue is not can labor be withdrawn from a technologically stagnant agriculture without a drop in agricultural production, but rather, what level of taxes or other means of capital transfer can be placed on the economic sector and under what circumstances?"

T. Schultz, in commenting, states that Mellor should have relied more heavily on traditional price theory, comparative advantage, and the end effects of inflation and general monetary and fiscal policies. He also suggests that Mellor's notion of taxation is one-sided and detrimental to agricultural development.

The late John Brewster has a chapter treating traditional social structures as barriers to development. He felt that economic behavior was an interlock of three components: technological, organizational, and cultural. Most of the ideas Brewster presented here have been presented by him elsewhere. But this application may be an even more fertile one than on previous occasions. Though Brewster's illustrations are more nearly applicable to the Asian rather than other scenes, he has again made his point that not all decisions are made on the basis of economic criteria. Thus to establish the economic profitability of an endeavor is not a sufficient condition to insure or predict its implementation.

Clifton Wharton provides a very informative discussion of the infrastructure for economic growth. He cites the failure of agricultural economists to study key components of infrastructure, sets out some priority research needs, and builds a sound case for the involvement of the public sector in providing this infrastructure. Of particular interest is Wharton's thesis that agricultural economists have probably neglected the study of infrastructure in developing countries because the building of this infrastructure at home preceded the emergence of agricultural economics researchers. Thus, the researchers had little if any previous involvement and experience on which to draw.

Subsequent chapters deal with the role of the following topics in agricultural development: food and nutrition, international trade, education and training, marketing institutions, land reform, taxation, and price policy. All authors treat their topics with a good deal of competence. Among the more interesting discussions is the one by Tolley and Gwyer in providing a framework to evaluate international trade in agricultural products. They set up a tableau depicting (1) domestic food, (2) cash export crops, (3) nonagricultural private, (4) government, and (5) rest-of-world sectors, and then look at the effects of changing the magnitudes of different components of the tableau. They also treat both the balanced growth and comparative advantage bases for guiding production choices.

Chapters on food and nutrition and on land reform provide convincing evidence of the importance of these factors to development. Others draw on a good deal of experience and insight to treat the economics of farm size, tropical agriculture, and the procedures for programming economic development.

It is difficult to take issue with the contention of the editors in the preface that, "if one broad conclusion emerges from the book it is how little we do know despite all that has been written, and how great is the need for empirical study and specific analysis, especially if development plans and decisions are to be well-informed." Extensive reference sections follow most chapters. In fact, some priority rationing would appear to have real merit, though part of this rationing can be gained from the references that are relied on most heavily by the authors. The comment sections following the chapters are particularly helpful to the reader not completely familiar with the literature on this subject matter. The net effect, however, is often the one of leaving the reader without a very well "pinned down" position on the topic. As is inevitable in a book of this type, substantial repetition occurs, but this has some merit in pointing up the common ground accepted by scholars working on economic development. The same may be said of the

variation in experience from which the various writers speak. It would have been unfortunate indeed if all authors had only had a common experience relating to one or two less developed countries. Overall, the book is a comprehensive one, and a good one--quite a substantial cut above the usual multi-author package.

W. B. Sundquist

Agricultural Financing in India, with Special Reference to Land Mortgage Banks

By S. N. Ghosal. Asia Publishing House. U.S. distributor, Taplinger Publishing Co., New York. 199 pages. 1966. $7.

NO COUNTRY struggling with development problems has made a more determined effort to set up an efficient farm credit system than India. The comprehensive and well-organized farm credit survey conducted by the Reserve Bank of India in the 1950's is an example of this effort. But, as Mr. Ghosal points out in this book, the creation of an extensive cooperative credit system for farmers proposed as a result of the survey is not turning out to be the easy solution that many hoped it would be.

This book on financing farmers in India highlights many of the staggering credit problems that exist, such as heavy debts contracted for nonproductive purposes and owed to local moneylenders, and the difficulty of providing and servicing productive loans to farmers with small acreages in villages far from the money centers.

The author suggests a system of Land Development Mortgage Banks whose function would be much broader than the long-term (real estate) loans extended in the United States. These banks would provide loans for crop production, farm improvements and implements, commodity storage, facilities such as grist mills and irrigation equipment, and marketing.

William G. Murray

Food and Fiber for the Future

Report of the National Advisory Commission on Food and Fiber. U.S. Government Printing Office. 361 pages. 1967. $1.25 (Paper)

THIS REPORT is a good compendium of rural and agricultural problems and, perhaps, more frank in facing up to these problems than any similar effort of recent years. The recommendations contained in the report are equally candid though, in some cases, a bit utopian.

The report is divided into three major parts plus an introduction and an appendix. The introduction describes the task assigned to the Commission by the President. The three major subsections are: Conclusions and Recommendations, which describes the product of the Commission's deliberations; Food and Fiber Policy for the Future, which presents the rationale for the conclusions and recommendations; and finally, the Staff Economic Analysis, which consists of 13 staff papers prepared as background for the Commission and its deliberations.

One of the interesting aspects of this report is that it seems to have set aside, or at least altered, the old "liberal" and "conservative" political polarizations which have characterized farm policy discussions over the past 15 years. Some polarization remains though at times the reader is left in doubt as to which is the liberal and which is the conservative viewpoint. On certain issues the Commission was divided with majority and minority positions, though the margin was close--16 to 13. As might be expected, the major divisions occurred with respect to commercial agricultural policy. But even here there was little disagreement on the longer term objectives--"market orientation" in the operation of farm price policy--and the longer term program mechanisms--"positive programs to encourage resource adjustment." The major disagreement was over the need for commodity payments to producers to provide income support during periods of low commodity prices. The majority supported such payments while the minority favored direct income payments to offset net income

deficiencies during transition to a market-oriented agriculture. Other differences between the two factions are cited but would be hard to summarize. In general, the differences are subtle and intelligent--a departure from the "control" vs. "freedom" extremes which characterized so much of the farm policy dialog of 5 and 10 years ago.

One of the more significant aspects of the report is the unanimity on the need for better opportunities for rural people generally. The report states: "The most important--and neglected--aspect of policy for agricultural adjustment is the task of finding better opportunities for the farm people whose prospects in agriculture are limited by the onset of farm technology." The report provides considerable background for this recommendation though it is, perhaps, most utopian of the recommendations. It defines a set of important objectives, but falls somewhat short of telling us how we get from here to there. In this area, the Commission's work supports the concern of many agricultural economists but provides few of the answers.

Some may be disappointed in the fact that the Commission did not come up with all the answers to some difficult problems. But the report can be viewed and should be given credit as a good contemporary review of policy, not just for agriculture but for rural areas and for rural people.

Linley E. Juers

Regional Accounts for Policy Decisions

Edited by Werner Z. Hirsch. The Johns Hopkins Press, Baltimore, Md. 230 pp. 1966. $6.50.

THE SIX PAPERS in this collection were presented at the 1964 Conference on Regional Accounts, the third such conference held under the auspices of Resources for the Future. In his introduction, Werner Z. Hirsch says that the 1964 conference "...made a special effort to investigate regional accounts and information systems which would elucidate and provide help for specific regional policy decisions."

The contributors deal with a variety of topics: Urban renewal (Lowdon Wingo, Jr.); public school decisions (Werner Z. Hirsch); urban economic development (Wilbur R. Thompson); State planning and development (Robert S. Herman); the influence of national decisions on regional economies (Marvin Hoffenberg and Eugene J. Devine); and criteria for evaluating regional development programs (George H. Borts). Provocative comments follow each paper.

Why should agricultural economists read this book? One elementary reason is that members of the fraternity of economists--better yet, social scientists--ought to know what is going on outside of their own fields of specialization. I discovered in this book problems and approaches quite analogous to those in agricultural economics, as well as a few clues to possibilities for improvement in agricultural research. More important, perhaps--as the historical boundaries between urban and rural matters become fuzzy, if not meaningless--we need to look beyond old subject-matter fences. The growing emphasis on domestic and foreign economic development in USDA and university research demonstrates that such a broadening of scope is indeed underway.

A good deal of professional soul searching is evident in this book. Wilbur Thompson, in his paper on urban development, puts it this way: "We have been more interested in mental exercises than powerful issues--endlessly refining open-economy multipliers, the use of which is not always fully clear, or drawing cost curves in space, to stay in good standing with the guild." He goes on, "...if we wander about in our area development programs, it is probably as much due to not having picked destinations as to having poor road maps."

"Regional accounts" and "information systems" are not defined explicitly in the book, but I assume that they might also be called data and models, respectively. The information systems proposed in several of the papers are quite abstract but often elaborate. Falling generally in the category of simulation or systems analysis, these tools help to conceptualize policy problems and decision approaches, a function that alone may justify their development. Still, I see in several papers a desire to do much more with systems than merely conceptualize. Ruth Mack offers good advice on this matter. Commenting on Hirsch's system to aid public school decisions, she wonders

"...how often the right questions, that is, the critically important ones, would actually fall within the accounts framework...it seems to me that we need to be very thoughtful about which do and which do not." Mack recognizes that "...in this uncertain world, a number and particularly an orderly system of numbers, is a great comfort." But she fears the "number illusion" or tendency to give greater authority to relevant facts with figures attached to them than to equally relevant facts of an unmeasured quantity. There is a lesson here for all model builders and users.

The papers and comments in this book provide social scientists and policymakers with a useful dialog on various policy problems and approaches. Hirsch opens the book expressing hope that the papers bring us a little closer to the goal of providing decision makers with useful informational systems. No doubt the authors do move us a step closer. But many more steps seem to lie ahead, and I did not close this book with a conviction that the path will be direct or the journey smooth. I get an uneasy feeling from the papers, as I have from some of our own work in agriculture, that economists spend a frightening amount of time talking to each other and not enough time communicating with policymakers and trying out their ideas in a real world setting. I, for one, would like to see a sequel to this book on actual applications of informational systems to specific policy problems.

W. Neill Schaller

The Pesticide Problem: An Economic Approach to Public Policy

By J. C. Headley and J. N. Lewis. The John Hopkins Press, Baltimore, Md. 141 pages. 1966. $3.50.

MANY OF THE ISSUES involving the public concern for chemical residues found in our food and water are economic in nature. Yet many scientific writers today do not realize or do not point out the important economic implications associated with the use of pesticides.

Until now economists have taken little interest in problems arising from the use of pesticides. Most of our economic studies have lumped pesticide costs into a miscellaneous category with other small cost items. This has been true because pesticides have not been an important cost in the production of most crops and livestock, and also because we have had very little information relating to farmers' use of pesticides.

Headley and Lewis proceed on the premise that the questions raised by the addition of large quantities of pesticides to the environment cannot be satisfactorily resolved by resorting to panaceas or by treating the problem as though it were independent of other elements of technology. They attempt to place the pesticide problem in perspective and to treat it as part of the more general problem of pollution and environmental quality.

The authors recognize that a complete appraisal of the social costs and benefits of pesticides has not been made and perhaps will not soon be made because of values not measured by the market and because of deficiencies in the data concerning technical relationships among pesticides and agricultural production, health, and natural resources. However, they do present a conceptual decision framework for the formulation of policy. This framework considers an optimal pest control policy to be one determined by the maximization of social values. It translates adverse effects from pesticides into economic variables and shows the policy implications for different values that these variables might take. Using supply and demand for agricultural products as measures of the resource cost and consumer satisfaction, respectively, the effects of pesticide technology on resources devoted to agricultural production and of consumer satisfaction are analyzed. The discussion also includes the attendant conceptual and measurement problems.

The potential consequences of pesticide use on agricultural productivity, on human health, and on fish and wildlife are reviewed. And finally, suggestions for future research are made along with an examination of the current institutions that provide for regulation of pesticide usage and protection of consumers. A plea is made for research cooperation among physical, natural, and social scientists to achieve results leading to policies that consider the broad range of values involved.

The book is a substantive contribution to our knowledge and is both encouraging and discouraging in terms of providing guidelines for economic analysis of pesticide use. The transfer of traditional welfare economics and supply and demand principles into a conceptual framework for analyzing pesticide problems is a useful first step in analyzing the problem. However, the weaknesses of the models are soon apparent as one recognizes the lack of data to quantify the variables needed for analysis.

Despite the difficulty of translating the theoretical model into an econometric model, Headley and Lewis have prepared a very readable book. It is an excellent review of pertinent literature. The task now is to find ways of applying these ideas within an economic framework to obtain solutions to questions related to the use of pesticides.

Velmar W. Davis

A Critical Review of Research in Land Economics

By Leonard A. Salter, Jr., with an Introductory Essay by M. M. Kelso. The University of Wisconsin Press, Madison. 258 pages. 1967. $7.50 cloth, $2.95 paper.

WRITTEN AS A Ph.D. dissertation in 1946 and first published in 1948 by the University of Minnesota Press after the death of the author, this book has been reprinted by the University of Wisconsin Press with a foreword by M. M. Kelso. The first part of the book is a historic account of the growth of land economics as a subdiscipline. Next is the development of Salter's concept of the scientific method as applied to land economics research. Last is a review and evaluation based on some 500 research reports.

With few exceptions, Salter found methods used in land economics research deficient. In some cases, the research was oriented to real social problems but methods used were informal and did not provide evidence to support conclusions and recommendations. In other cases where statistical techniques were used for precise quantification, problems often were not well articulated.

Salter's thesis is that the research should be carried out in the context of developing and implementing solutions for real social problems. He reviews the various research methods whose relative merits were being debated at that time and places them all within the general framework of inquiry developed by John Dewey. Salter sees research "as a process of inquiry, with problems emanating from, and tested in, experience, with generalizations serving instrumentally to suggest possible causative connections in experience, and with tests dependent upon such relations in the evidence of experience."

In 1948, the book filled a serious void in the literature. While land economics research has not taken exactly the course prescribed by Salter, he precipitated much healthy debate which is still in progress and he has had impact even on those who were and are in basic disagreement with him. The book still has a place in the libraries of those engaged in economics research--resource economics, in particular--for reference in formulating research problems. Attention is called particularly to chapter II on the development of rural land economics and chapter III on scientific method. These chapters are a valuable reference for research methodology and should be required reading for all graduate students in agricultural economics.

The book is slow reading in parts and is not a cookbook for research. Land problems have changed in 20 years, as have analytical techniques and data-handling capabilities. However, the book continues to be useful as a history and assessment of land economics research to World War II and for its presentation of a distinct philosophy for land economics research.

Robert C. Otte

The People Left Behind

President's National Advisory Commission on Rural Poverty. U.S. Government Printing Office. Washington, D.C. 160 pages. 1967. $1.

DURING ITS FIRST TWO years or so, the national "War on Poverty" seemed to be devoted solely to urban problems. There were

serious outcries about neglect of rural poverty. Partially as a result of this feeling of neglect, the President in September 1966 appointed a National Advisory Commission on Rural Poverty. The Commission was to make an exhaustive study and report within one year. This publication constitutes that report.

The title of the publication represents not only this neglected feeling on the part of rural America, but also the problem that rural poverty is not generally recognized by the public as being extensive or serious. Long-time agricultural programs have lulled the public into supposing that farmers "had it good through price supports and subsidies," and that farmers were rural America. Of course, students know that neither supposition is true. Price supports and production subsidies do not reach poor farmers, and most residents of rural America are no longer farmers.

The report is presented in two parts: Part I, with two chapters, outlines the extent of the problem and the urgency of attacking the problem now. Part II is divided into 12 chapters, each one dealing with what the Commission felt to be some important aspect of the rural poverty situation. These range from macroconsiderations such as "Creating a Favorable Economic Environment," to such items as health and medical care, rural housing, and more effective government.

Substantively, this volume, probably for the first time, ties together some of the broader issues with more specific questions involved in solutions to poverty problems. The reader probably will wish more analysis and more specific information about certain considerations, but one must keep in mind that the report is a summary, drawing not only from technical papers prepared for the Commission, but also drawing heavily from numerous sources of research already done on this subject. Chapters 3 through 14 are largely recommendations for action. That these recommendations have breadth and yet minuteness is illustrated by two of them--"that the United States Government stand ready to provide jobs at the National minimum wage, or better, to every unemployed person willing and able to work," and "that a classroom seat be provided for every Indian child of school age." Of course, the reader is aware that there has been no policy for Government to be the employer of last resort, but I am sure that those who have considered themselves students of poverty have not known that thousands of such minority groups have not had such rudimentary facilities as classroom seats.

Space is not adequate to attempt evaluations of the more than 150 recommendations, classified under various chapters, and including the economic environment, manpower policy and programs, education, health and medical care, family planning, helping those in need, rural housing, area and regional development, community organization, conservation and development of natural resources, adjustments in agriculture, and more effective government for rural opportunity. One of the problems of studying this report will be the large number of recommendations, with no highlighting to show which are the more important. In fact, this was recognized by one of the Commission members in a memorandum of reservation when he said, "...in my opinion some parts of the report cover matters which have little, if any, connection with the problems of rural poverty." However, when one looks at the broad charge to the Commission, it is difficult to see how a multiplicity of recommendations could have been avoided, though perhaps some priority of importance could have been recognized. The similarity of many of these recommendations to earlier ones from the Department of Agriculture will be recognized by the reader. Perhaps this is evidence that not much that is new can be said about the problem with our current knowledge.

The Commission and staff have done yeoman service in focusing on this facet of America's poverty problem, and in bringing current information to bear on solutions. This will be an excellent addition to the literature on poverty, particularly when the promised technical supplements are published. Surprisingly, there is no dissent to this report by any Commission member, although there are several statements of reservation to specific recommendations.

John H. Southern

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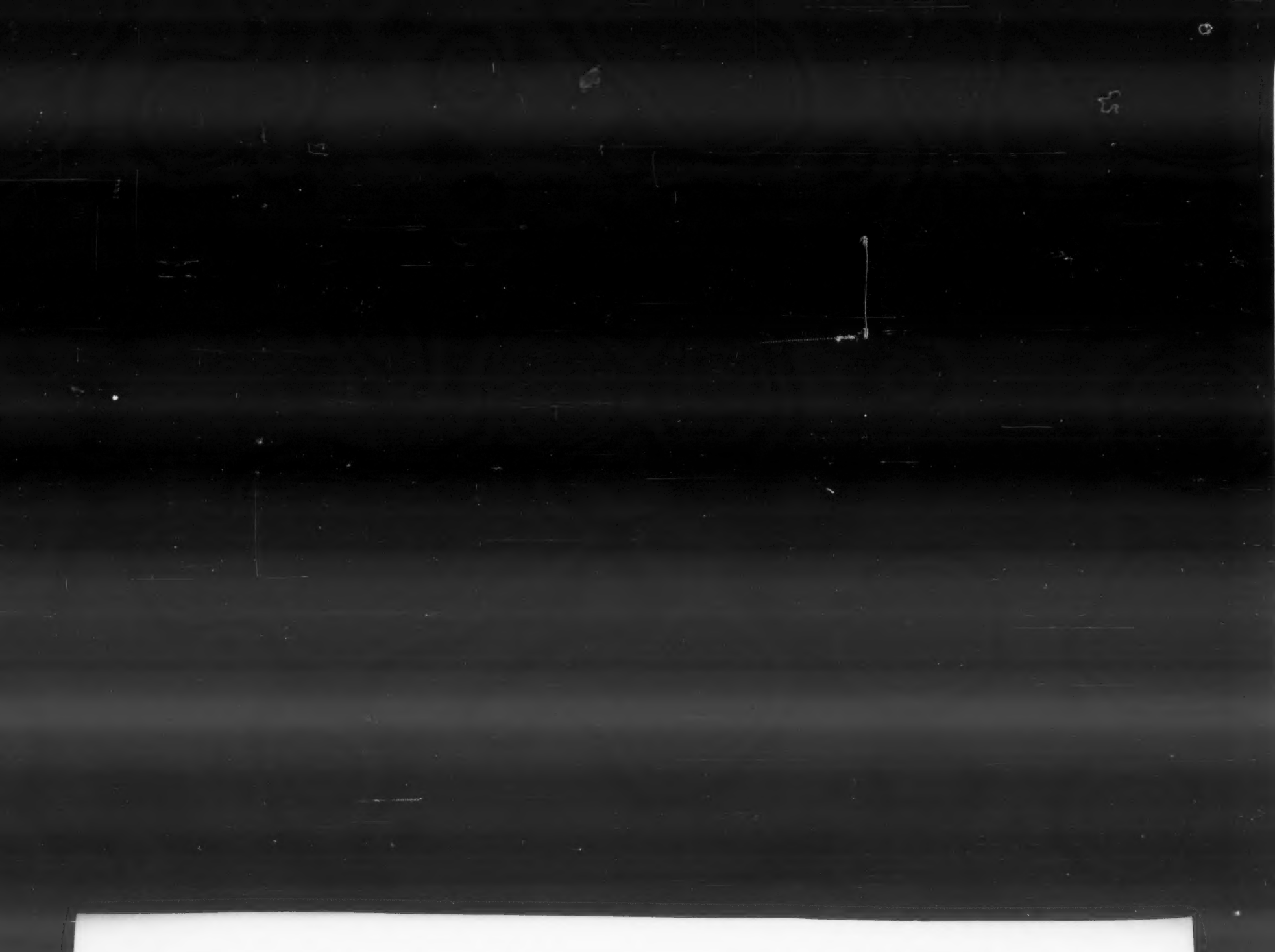

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